CHAPTER 29

SAMPLING AND LABORATORY TESTING

29-1 Scope

29-1.1 This chapter contains policy and guidance applicable to environmental sampling and laboratory testing. It identifies requirements and responsibilities for implementing environmental quality systems into Navy activities and programs involving the collection, management, and use of environmental data to ensure that the measurements and collected data are accurate, meet requisite acceptance or performance criteria, and are appropriate for their intended use by the Navy in making decisions concerning the environment.

29-1.2 The provisions of this chapter apply to all sampling and testing activities performed by the Department of the Navy, or by public and private organizations on behalf of the Navy. This chapter applies to activities and programs involving the collection, management, and use of environmental data at Navy operations, activities, and installations worldwide, including GOCO facilities.

29-1.3 This chapter applies to the collection and use of environmental data supporting all applicable Federal, State, and local laws and regulations including, but not limited to, CAA; SDWA; RCRA; CERCLA; NEPA; TSCA; CWA; OPA; PPA; OSHA (references (a) through (j) respectively); and relevant E.O.'s and DOD policies and procedures.

29-1.4 The requirements of this chapter do not apply to contractor-owned and contractor-operated facilities that are not on real property controlled by DOD.

29-1.5 For the purposes of this chapter, the term 'environmental data' refers to any measurement or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology. This chapter does not supersede more stringent requirements that may be invoked by other documents issued by EPA; the NAVOSH Program; the ER,N and BRAC Cleanup Program; other Federal, State and local regulations; or the NNPP.

29-1.6 This chapter implements DOD and intergovernmental quality systems policy, including the DOD Information Quality Guidelines, *Ensuring the Quality of Information Disseminated to the Public by the Department of Defense* (DOD IQG, reference (k)), *Department of Defense Quality Systems Manual for Environmental Laboratories* (DOD QSM, reference (l)), *Uniform Federal Policy for Implementing Environmental Quality Systems* (UFP-QS, reference (m)), and *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP, reference (n)).

a. The DOD QSM (reference (l)) provides requirements and guidance developed by the DOD Environmental Data Quality Workgroup (EDQW) for the implementation of ISO/International Electrotechnical Commission (IEC) 17025:1999, *General requirements for the competence of testing and calibration laboratories* (reference (o)) and ISO/IEC 17011:2004, *Conformity assessment – general requirements for accreditation bodies accrediting conformity assessment bodies* (reference (p)). ISO/IEC 17025:1999 provides the minimum set of requirements for laboratory quality systems. ISO/IEC 17011:2004 provides the minimum set of requirements for laboratory accreditation. [Note: Laboratories that comply with ISO/IEC 17025:1999 will also meet the requirements of ISO 9000:2005, *Quality management systems—Fundamentals and vocabulary*, and ISO 9001:2000, *Quality management systems—Requirements* (references (q) and (r)).]

b. The UFP-QS (reference (m)) provides guidance and interpretation developed by the Intergovernmental Data Quality Task Force (IDQTF) and the DOD EDQW for the implementation of ANSI/ASQ E4-2004, *Quality systems for environmental data and technology programs – requirements with guidance for use* (reference (s)). ANSI/ASQ E4-2004 is the national consensus standard that provides the minimum set of requirements to enable organizations to plan, implement, and assess environmental quality systems.

29-1.7 References. An effective program for the management and control of environmental sampling and testing activities must integrate the relevant requirements contained in references (a) through (bb).

(a) Section 7401 of Title 42, United States Code (Clean Air Act);

(b) Section 300f of Title 42, United States Code (Safe Drinking Water Act);

(c) Section 6901 of Title 42, United States Code (Resource Conservation and Recovery Act);

(d) Section 9601 of Title 42, United States Code, as amended by Section 1101 of Title 42 United States Code (Comprehensive Environmental Response, Compensation, and Liability Act);

(e) Section 4321 of Title 42, United States Code (National Environmental Policy Act);

(f) Section 2601 of Title 15, United States Code (Toxic Substances Control Act);

(g) Section 1251 of Title 33, United States Code (Clean Water Act);

(h) Section 2701 of Title 33, United States Code (Oil Pollution Act);

(i) Section 13101 of Title 42, United States Code (Pollution Prevention Act);

(j) Section 651 of Title 29, United States Code (Occupational Health and Safety Act);

(k) Deputy Secretary of Defense Memorandum, Ensuring the Quality of Information Disseminated to the Public by the Department of Defense, (DOD IQG) February 10, 2003;

(l) Department of Defense Quality Systems Manual for Environmental Laboratories (DOD QSM), January 2006 (or latest version), DTIC # ADA 396793;

(m) Uniform Federal Policy for Implementing Environmental Quality Systems (UFP-QS), January 2004, DTIC # ADA 395303;

(n) Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), March 2005, DTIC # ADA 427785;

(o) ISO/IEC 17025:1999, General requirements for the competence of testing and calibration laboratories;

(p) ISO/IEC 17011:2004, Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies;

(q) ISO 9000:2005, Quality management systems – Fundamentals and vocabulary;

(r) ISO 9001:2000, Quality management systems – Requirements;

(s) ANSI/ASQ E4-2004, Quality Systems for Environmental Data and Technology Programs – Requirements with guidance for use;

(t) ISO/IEC Guide 2:1996, *Standardization and related activities – General vocabulary;*

(u) United States Nuclear Regulatory Commission, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), EPA 402-R-97-016, Revision 1, NUREG-1575, Rev-1, DOE/EH-0625, Rev-1, August 2000;

(v) Unites States Nuclear Regulatory Commission, *Multi-Agency Radiation Laboratory Analysis Protocol* (MARLAP), Volumes 1-3, EPA 402-B-04-001A-C, NUREG 1576, July 2004;

(w) NAVFAC, *Department of the Navy Environmental Restoration Program Manual*, August 2006;

(x) 40 CFR 792, EPA Good Laboratory Practice Standard;

(y) 49 CFR 100-199, DOT Hazardous Materials Regulations (in particular, 49 CFR 172-199);

(z) 29 CFR 1910.1200, OSHA Hazard Communication Standard;

(aa) 29 CFR 1910.1450, OSHA Occupational Exposure to Hazardous Chemicals in Laboratories;

(bb) OPNAVINST 5100.23D, NAVOSH Program Manual.

29-2 Legislation

The Navy requires sampling and testing to support environmental decision-making, promote the wise use of environmental resources, and determine compliance with environmental regulations. States and local agencies may invoke more stringent laws and regulations including requirements such as certification for sampling and testing. It is imperative that managers consult the applicable regulations and/or regulatory agencies in order to identify specific requirements.

29-3 Terms and Definitions

Definitions for the following terms come principally from the quality systems policy documents (references (l) through (n)) and the quality systems standards (references (o) through (s)), supplemented where necessary by definitions contained in ISO/IEC Guide 2:1996, *Standardization and related activities – General vocabulary* (reference (t)). Other documents may provide more specific definitions. Where the terms are defined in applicable laws, regulations, and associated test methods, those definitions take precedence.

29-3.1 Accreditation. Third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks. (ISO/IEC 17011:2004)

29-3.2 Accreditation body. Authoritative body that performs accreditation. (ISO/IEC 17011:2004)

29-3.3 Assessment. The evaluation process used to measure the performance or effectiveness of a system and its elements against specific criteria. (ANSI/ASQ E4-2004)

29-3.4 Certification. Procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements. (ISO/IEC Guide 2:1996)

29-3.5 Conformity. Fulfillment by a product, process or service of specified requirements. (ISO/IEC Guide 2:1996)

29-3.6 Consensus standard. A standard established by a group representing a cross section of a particular industry or trade, or part thereof. (ANSI/ASQ E4-2004)

29-3.7 Contractor. Any organization or individual contracting to furnish services or items or to perform work. (UFP-QAPP)

29-3.8 Environmental data. Any measurement or information that describes environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology. (ANSI/ASQ E4-2004)

29-3.9 Graded approach. The process of basing the level of application of managerial controls applied to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results. (ANSI/ASQ E4-2004)

29-3.10 Improper action. Deviation from contract-specified or method-specified analytical practices, whether intentional or unintentional. (DOD QSM)

29-3.11 Laboratory. A body that calibrates or tests. (DOD QSM)

29-3.12 Proficiency testing. A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (DOD QSM)

29-3.13 Quality. Degree to which a set of inherent characteristics fulfills the requirements. (ANSI/ASQ E4-2004)

29-3.14 Quality Assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled. (ANSI/ASQ E4-2004)

29-3.15 Quality Assurance Project Plan. A formal document describing in comprehensive detail the necessary QA, QC, and other technical activities that shall be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. (ANSI/ASQ E4-2004)

29-3.16 Quality Control. Part of quality management focused on fulfilling quality requirements. (ANSI/ASQ E4-2004)

29-3.17 Quality Management Plan. A formal document or manual, usually prepared once for an organization that describes the quality system in terms of the organizational structure, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, and assessing all activities conducted. (ANSI/ASQ E4-2004)

29-3.18 Quality System. A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. (ANSI/ASQ E4-2004)

29-3.19 Surveillance (quality). Continual or frequent monitoring and verification of the status of an entity and the analysis of records to ensure that specified requirements are being fulfilled. (ANSI/ASQ E4-2004)

29-3.20 Systematic planning process. A process that is based on the scientific method and includes concepts such as objectivity of approach and acceptability of results. Systematic planning is based on a common-sense, graded approach to ensure that the level of detail in planning is commensurate with the importance and intended use of the work and the available resources. This framework promotes communication among all organizations and individuals involved in an environmental program. Through a systematic planning process, a team can develop acceptance or performance criteria for the quality of the data collected and for the quality of the decision. (UFP-QS)

29-3.21 Test. Technical operation that consists of the determination of one or more characteristics of performance of a given product, process or service according to a specified procedure. (ISO/IEC Guide 2:1996)

29-3.22 Unethical (Illegal) action. Deliberate falsification of analytical or quality assurance results, where failed method or contractual requirements are made to appear acceptable. (DOD QSM)

29-3.23 Validation. Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. Validation is a sampling and analytical process evaluation that includes evaluating compliance with methods, procedures, or contracts, and comparison with criteria based upon the quality objectives developed in the project QAPP. The purpose of validation is to assess the performance associated with the sampling and analysis to determine the quality of specified data. (UFP-QAPP)

29-3.24 Verification. Confirmation by examination and provision of objective evidence that specified requirements (sampling and analytical) have been completed. This is a completeness check. (UFP-QAPP)

29-4 Requirements

29-4.1 Navy activities shall work with all applicable regulatory authorities and land management agencies, including those representing the Federal government, States, local governments, tribes, U.S. territories and possessions, and host nations to identify applicable requirements and to define procedures for the planning, collection, and use of environmental data, such that the data meet applicable requirements.

29-4.2 Navy activities shall implement environmental quality systems for the collection and use of environmental data consistent with the DOD QSM (reference (l)), UFP-QS (reference (m)), and UFP-QAPP (reference (n)).

29-4.3 Quality assurance practices and programs that conform to the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (reference (u)) and the *Multi-Agency Radiation Laboratory Analysis Protocols* (MARLAP) (reference (v)) meet the intent of this chapter with respect to the collection, management, and use of radiological data for the NNPP.

29-4.4 In addition to the requirements of this chapter, sampling and testing activities performed by, or on behalf of, the Navy under ER,N and BRAC programs shall conform to the *Department of the Navy Environmental Restoration Program Manual* (reference (w)).

29-4.5 Sampling and testing activities performed by, or on behalf of, the Navy shall employ the principle of the graded approach, which is described in the UFP-QAPP (reference (n)), in the development of quality systems documentation. In this approach, the level of complexity and detail in quality systems documentation is matched to the importance or significance of the decisions to be made based on the data.

29-4.6 Navy activities shall maintain a basic standard of quality as required under the DOD IQG (reference (k)).

29-5 Navy Policy

29-5.1 Conformance with Uniform Standards. Navy activities, including contractors and subcontractors, shall perform sampling and testing per a documented quality system meeting the requirements of the UFP-QS (reference (m)) and Federal, State and local requirements, which shall be appropriate to the type and scope of sampling and testing performed. Quality systems documentation must describe all quality assurance surveillance activities as well as specific procedures that will be used to review and substantiate the quality of environmental data before it is disseminated to the public. Quality systems documentation must support, and be consistent with, established Navy administrative mechanisms allowing affected persons to seek and obtain correction of information that does not comply with the DOD IQG (reference (k)). Organizations performing sampling and testing for Navy shall have a documented program to prevent improper, unethical, or illegal actions. In all cases where environmental sampling and testing services are performed, quality assurance surveillance must be performed by a Navy Quality Assurance Manager (QAM), however named.

29-5.2 Uniform Standards for Sampling. Navy activities, including contractors and subcontractors, shall perform environmental sampling activities according to a documented quality system. Quality systems documentation shall include the following:

a. Documentation of the sampling organization's Quality System (usually called a Quality Management Plan or QMP) in accordance with the UFP-QS (reference (m)).

b. Documentation of project-specific sampling, testing, QA, and QC activities (usually called a Quality Assurance Project Plan or QAPP) in accordance with the UFP-QAPP (reference (n)).

29-5.3 Uniform Standards for Laboratory Testing. Laboratories, including contractor and subcontractor laboratories, shall perform environmental testing according to a documented quality system. The laboratory must document its Quality System in accordance with the DOD QSM Version 3 (reference (l)) (or latest version). All laboratories must demonstrate the ability to generate acceptable results from the analysis of proficiency-testing (PT) sample(s), subject to availability, using each applicable method in the specified matrix. Upon request, laboratories must provide, to the Department of the Navy, the results of all PT samples analyzed by the laboratory during the project's period of performance. All laboratories are subject to project-specific, on-site assessments by authorized Navy or DOD representatives. Testing performed in the field, or in a mobile laboratory facility, is subject to the same requirements as testing performed in a permanent laboratory facility. Testing shall be performed by laboratories having appropriate credentials (e.g., certification or accreditation) to perform the specific type of testing, as required by the applicable regulatory agency. Any exceptions to the Uniform Standards contained in this paragraph must be approved by the Navy Laboratory Quality and Accreditation Office (LQAO).

a. **Certification.** Laboratories must possess any applicable State or host nation certification. A certification in one program, State or nation cannot be used as justification to perform testing in another program, State, or nation, unless reciprocity or equivalency of certification is recognized by the appropriate regulatory agency.

b. **Accreditation.** In the absence of certification requirements, laboratories must be accredited for each applicable test method by a nationally recognized laboratory accreditation body (e.g., an accrediting authority approved by the National Environmental Laboratory Accreditation Program

(NELAP) or the American Association for Laboratory Accreditation (A2LA)) operating in accordance with ISO/IEC 17011:2004 (reference (m)).

29-5.4 Prohibited Practices. Organizations performing sampling and testing on behalf of Navy are expected to adhere to professional standards of ethical conduct defined in quality systems documentation and must not engage in any prohibited practices. Following is a list of prohibited practices developed by the DOD EDQW. The following practices will be considered material non-compliance with these Uniform Standards and may result in contract termination or other remedies as appropriate:

- Fabrication, falsification, or misrepresentation of data, e.g.,:
  - Creating data for an analysis that was not performed
  - Creating information for a sample that was not collected
  - Using external analysts, equipment and/or laboratories to perform analyses when not allowed by contract
- Improper clock setting (time traveling) or improper date/time recording, e.g.,:
  - Resetting the internal clock on an instrument to make it appear that a sample was analyzed within holding time when in fact it was not
  - Changing the actual time or recording a false time to make it appear that holding times were met, or changing the times for sample collection, extractions or other steps to make it appear that holding times were met
- Unwarranted manipulation of samples, software, or analytical conditions, e.g.,:
  - Unjustified dilution of samples
  - Manipulating Gas Chromatography/Mass Spectrometry (GC/MS) tuning data to produce an ion abundance result that appears to meet specific QC criteria
  - Changing the instrument conditions for sample analysis from the conditions used for standard analysis (e.g., changing voltage)
  - Unwarranted manipulation of computer software, e.g., forcing calibration or QC data to meet criteria, removing computer operational codes such as the “manual” or “M” flag, inappropriately subtracting background, or improperly manipulating the chromatographic baseline
  - Turning off, or otherwise disabling, electronic instrument audit/tracking functions
- Misrepresenting or misreporting QC samples, e.g.,:
  - Representing spiked samples as being digested or extracted when this has not been done

- Substituting previously generated runs for a non-compliant calibration or QC run to make it appear that an acceptable run was performed

- Failing to prepare or analyze method blanks and Laboratory Control Samples (LCS) in the same manner that samples were prepared or analyzed

- Tampering with QC samples and results, including over spiking and adding surrogates after sample extraction

- Performing multiple calibrations or QC runs (including CCVs, LCSs, spikes, duplicates and blanks) until one meets criteria, rather than taking needed corrective action, and not documenting or retaining data for the other unacceptable data

- Deleting or failing to record non-compliant QC data to conceal the fact that calibration or other QC analyses were non-compliant

– Improper calibrations, e.g.,:

- Discarding points in the initial calibration to force the calibration to be acceptable

- Discarding points from a Method Detection Limit (MDL) study to force the calculated MDL to be higher or lower than the actual value

- Using an initial calibration that does not correspond to the actual run sequence to make continuing calibration data look acceptable when in fact it was not

- Performing improper manual integrations, including peak shaving, peak enhancing, or baseline manipulation to achieve QC criteria or to avoid corrective action

– Concealing a known analytical or sample problem from laboratory management and/or client

– Concealing a known improper or unethical behavior or action from management; and

– Failing to report the occurrence of a prohibited practice or known improper or unethical act to the appropriate laboratory or contract representative, or to an appropriate government official.

29-5.5 Contract Improvement. The uniform standards contained in this chapter shall be incorporated into all solicitations and contracts involving sampling or testing performed by, or on behalf of, the DON. This requirement also applies to orders placed by non- DOD agencies (e.g., GSA) on behalf of the Navy. The Navy shall require Contracting Officer's Representatives (CORs) to consult technically qualified personnel when providing contract support services for solicitations and contracts involving environmental sampling or testing. The Navy shall document non-conformance with contract specifications, including quality systems specifications, and execute contract remedies, where appropriate.

29-5.6 Training Requirements. Personnel involved in sampling or testing shall have the appropriate education, experience, and training to perform their assigned tasks. Sampling and testing organizations shall document training and keep records current, in accordance with their quality systems documentation.

a. **Training Requirements for Navy Environmental Professionals, Specialists and Technicians.** Personnel acting as environmental program managers, who routinely request sampling and testing and/or develop sampling and testing quality systems documentation as part of their management of a program shall have the following minimum training, provided via a documented training plan:

- Environmental laws and regulations relative to the specific environmental program for which sampling and testing are being conducted;

- Systematic Planning Process or development of Data Quality Objectives [Note: Successful completion of the *Uniform Federal Policy for Quality Assurance Project Plans* training course (A-4A-0095) sponsored by CECOS will satisfy this requirement]; and

- Training applicable to the specific area(s) of program management relative to sampling plan development (e.g., sampling and testing for NPDES compliance).

b. **Training Requirements for Sampling Personnel.** Documentation of training must include, at a minimum [Note: Successful completion of the Environmental Quality Sampling (EQS) course (A-4A-0026) sponsored by CECOS will satisfy these requirements]:

- Basic sampling techniques (e.g., grab sampling, composite sampling, how to avoid contamination, use of preservatives, etc.);

- Specific sampling techniques as required (e.g., NPDES sampling, bacteriological sampling, potable water sampling, etc.);

- Completion of sampling documentation (e.g., sample container labels, field logs, and chain-of-custody documentation);

- Health and safety training; and

- Ethics training.

c. **Training Requirements for Laboratory Personnel.** Documentation of training must include, at a minimum:

- Demonstrations of analyst proficiency;

- Training in the laboratory quality system;

- Training in general laboratory operations;

- Specific training applicable to the tests to be performed;

- Health and safety training; and

- Ethics training.

29-6 Responsibilities

29-6.1 CNO (N45) shall:

(a) Issue policy/guidance, as appropriate, based on recommendations made by the Navy Environmental Laboratory Advisory Council (ELAC) and Navy LQAO.

29-6.2 BSOs shall:

(a) Plan, program and budget for environmental sampling and testing;

(b) Ensure shore activities comply with the requirements of this chapter;

(c) Provide technical assistance and prepare appropriate manuals or other forms of guidance for implementing proper sampling and testing techniques at Navy activities; and

(d) When requested by the LQAO, provide a member to the ELAC (Note: this requirement applies only to major claimants that perform environmental sampling in-house, have environmental testing laboratories, or contract for at least $25,000 in laboratory services annually).

29-6.3 The Navy Laboratory Quality and Accreditation Office shall:

(a) Act as CNO's representative and Chair the Navy's ELAC;

(b) Coordinate meetings of the ELAC as needed to develop recommendations on guidance/policy for CNO;

(c) Provide overall guidance and direction for environmental sampling operations and laboratory testing improvement initiatives Navy-wide;

(d) Coordinate efforts across commands including continuous process improvement and cost efficiencies for Navy sampling and laboratory support services;

(e) Coordinate claimant approval and implementation of ELAC/LQAO recommendations;

(f) Develop an integrated approach to environmental sampling and testing;

(g) Recommend improvements in the Navy's sampling and testing program;

(h) Provide technical assistance and prepare appropriate manuals or other forms of guidance for implementing proper sampling and testing techniques at Navy activities; and

(i) Approve any exceptions to the Uniform Standards for laboratory testing contained in paragraph 29-5.3.

29-6.4 Environmental Laboratory Advisory Council shall:

(a) Assist the LQAO with the development of recommendations on guidance/policy for matters related to environmental sampling and testing.

29-6.5 COs of Shore Activities shall:

(a) Ensure that in-house environmental sampling operations and laboratories under their command comply with the requirements of this chapter;

(b) Ensure that mechanisms are in place so that environmental sampling and testing contracted out by the shore activity meet the Uniform Standards set forth in this Chapter, as well as Federal, State, local and other Navy sampling and laboratory testing requirements;

(c) Ensure that CORs, under their command, involved in oversight of sampling and testing contracts, consult with technically qualified scientists or technicians; and

(d) Ensure that training programs are established and maintained for sampling and testing personnel under their command, and that training is performed and properly documented.